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NOTICE OF ALLOWANCE AND FEE(S) DUE

156

7590

03/05/2009

Kirschstein, Israel, Schiffmiller & Pieroni, P.C.
425 FIFTH AVENUE
5TH FLOOR
NEW YORK, NY 10016-2223

EXAMINER

MIDKIFF, ANASTASIA

ART UNIT

PAPER NUMBER

2882

DATE MAILED: 03/05/2009

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/593,931	09/21/2006	Yoshikazu Nakanishi	KU-6 US	5457

TITLE OF INVENTION: X-RAY GENERATOR EMPLOYING HEMIMORPHIC CRYSTAL AND OZONE GENERATOR EMPLOYING IT

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	YES	\$755	\$300	\$0	\$1055	06/05/2009

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. **PROSECUTION ON THE MERITS IS CLOSED.** THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN **THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE** OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. **THIS STATUTORY PERIOD CANNOT BE EXTENDED.** SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: Mail **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
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or Fax **(571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

156 7590 03/05/2009

Kirschstein, Israel, Schiffmiller & Pieroni, P.C.
 425 FIFTH AVENUE
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 NEW YORK, NY 10016-2223

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Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/593,931	09/21/2006	Yoshikazu Nakanishi	KU-6 US	5457

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nonprovisional	YES	\$755	\$300	\$0	\$1055	06/05/2009

EXAMINER	ART UNIT	CLASS-SUBCLASS
MIDKIFF, ANASTASIA	2882	378-119000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a **Customer Number is required.**

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively, 1
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2
 3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☐ Issue Fee
☐ Publication Fee (No small entity discount permitted)
☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.
☐ Payment by credit card. Form PTO-2038 is attached.
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).

5. **Change in Entity Status** (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

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Date _____

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This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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10/593,931

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Yoshikazu Nakanishi

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EXAMINER

MIDKIFF, ANASTASIA

ART UNIT

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Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 241 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 241 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

Notice of Allowability

Application No.

10/593,931

Examiner

ANASTASIA MIDKIFF

Applicant(s)

NAKANISHI ET AL.

Art Unit

2882

- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to Applicant Amendment filed 12/22/08.
2. ☒ The allowed claim(s) is/are 21-32, 34 and 42-46.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some* c) ☐ None of the:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.
THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached
1) ☐ hereto or 2) ☐ to Paper No./Mail Date _____.
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. ☐ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application
6. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other _____.

/Anastasia Midkiff/
Examiner, Art Unit 2882

ATTACHMENT TO NOTICE OF ALLOWABILITY

Allowable Subject Matter

Claims 21-32, 34, and 42-46 are allowed.

The following is an examiner's statement of reasons for allowance:

With respect to Claim 21, the prior art of record teaches many of the elements of the claimed invention, including an x-ray generator, comprising: a vessel for holding a low pressure gas atmosphere inside; hemimorphic crystal supporting means provided in said vessel; at least a pair of hemimorphic crystals supported by said supporting means in said vessel; and a heating and cooling means for elevating and lowering a temperature of said hemimorphic crystals, wherein x-rays are irradiated from said vessel as the temperature of said hemimorphic crystals are elevated or lowered.

However, prior art does not teach or fairly suggest the apparatus wherein said at least a pair of hemimorphic crystals are arranged oppositely to each other at a distance there between, in the manner required by Claim 21.

With respect to Claim 27, the prior art of record teaches many of the elements of the claimed invention, including an x-ray generator, comprising: a vessel for holding a low pressure gas atmosphere inside; hemimorphic crystal supporting means provided in said vessel; at least a pair of hemimorphic crystals supported by said supporting means in said vessel; a metal target supported by a target supporting means in said vessel; and a heating and cooling means for elevating and lowering a temperature of said hemimorphic crystals, wherein x-rays are irradiated from said vessel as the temperature of said hemimorphic crystals are elevated or lowered.

However, prior art does not teach or fairly suggest the apparatus wherein said at least a pair of hemimorphic crystals are arranged oppositely to each other at a distance there between, and wherein the target surrounds a space between said pair of hemimorphic crystals, in the manner required by Claim 27.

With respect to Claim 30, the prior art of record teaches many of the elements of the claimed invention, including an x-ray generator, comprising: a vessel for holding a low pressure gas atmosphere inside; hemimorphic crystal supporting means provided in said vessel; at least a pair of hemimorphic crystals supported by said supporting means in said vessel; a heating and cooling means for elevating and lowering a temperature of said hemimorphic crystals; and a metal target supported by a target supporting means in said vessel.

However, prior art does not teach or fairly suggest the apparatus wherein said at least a pair of hemimorphic crystals are hemimorphic crystal aggregates arranged oppositely to each other at a distance there between; said aggregates being composed of a number of hemimorphic crystals supported on a base and concavely curved, all of the crystals in one aggregate facing positively charged planes toward a side apart from the base and all of the hemimorphic crystals in the other aggregate facing negatively charged planes toward the side apart from said base, said pair of aggregates being arranged oppositely to each other at a concave side apart from said base thereof; and wherein the target is arranged in a space between said pair of hemimorphic crystal aggregates, in the manner required by Claim 30.

With respect to Claim 32, the prior art of record teaches many of the elements of the claimed invention, including an x-ray generator, comprising: a vessel formed of a material for blocking x-ray transmission and for holding a low pressure gas atmosphere inside; hemimorphic crystal supporting means provided in said vessel; at least a pair of hemimorphic crystals supported by said supporting means in said vessel; a heating and cooling means for elevating and lowering a temperature of said hemimorphic crystals; and a metal target supported by a target supporting means in said vessel.

However, prior art does not teach or fairly suggest the apparatus wherein said at least a pair of hemimorphic crystals are hemimorphic crystal aggregates arranged oppositely and joined to each other through a dielectric material; said aggregates being composed of a number of hemimorphic crystals supported on a concave side of hemispherical shell-shaped bases, all of the crystals in one aggregate facing positively charged planes toward a side apart from the base and all of the hemimorphic crystals in the other aggregate facing negatively charged planes toward the side apart from said base, said pair of aggregates being arranged oppositely to each other at a concave side apart from said base thereof and joined to each other through a ring-shaped dielectric material so as to form a spherical shell; and wherein the target is arranged in said spherical shell at a position including a center of said spherical shell, at least one of said aggregates being provided with one through hole so that an x-ray transmission window aligns with said at least one through hole, in the manner required by Claim 32.

With respect to Claim 42, the prior art of record teaches many of the elements of the claimed invention, including an ozone generator, comprising: a low pressure gas

sealing housing; a hemimorphic crystal arranged in said housing; a heating and cooling means for repeatedly heating and cooling said hemimorphic crystal arranged in said housing; and, a vessel for a material gas for generating ozone; said vessel being arranged adjacently to an outside or an inside of said housing; said vessel for the material gas for generating ozone being irradiated with soft x-rays generated from said hemimorphic crystal through an x-ray transmission window.

However, prior art fails to teach or fairly suggest the apparatus wherein a hollow cathode is arranged around the hemimorphic crystal, in the manner required by Claim 42.

With respect to Claim 43, the prior art of record teaches many of the elements of the claimed invention, including an ozone generator, comprising: a low pressure gas sealing housing; at least two hemimorphic crystals arranged in said housing; a heating and cooling means provided to each crystal for repeatedly heating and cooling said hemimorphic crystal arranged in said housing; and, a vessel for a material gas for generating ozone; said vessel being arranged adjacently to an outside or an inside of said housing; said vessel for the material gas for generating ozone being irradiated with soft x-rays generated from said hemimorphic crystal through an x-ray transmission window; and wherein a ring-shaped ozonization chamber is arranged in said apparatus.

However, prior art fails to teach or fairly suggest the apparatus wherein said at least two hemimorphic crystals are arranged oppositely to each other at a space there between, wherein said ozonization chamber is arranged at a side of the space, and

wherein said crystals thermal excitation takes place in a same phase or an opposite phase, in the manner required by Claim 43.

With respect to Claim 44, the prior art of record teaches many of the elements of the claimed invention, including an ozone generator, comprising: a low pressure gas sealing housing; at least two hemimorphic crystals arranged in said housing; a heating and cooling means provided to each crystal for repeatedly heating and cooling said hemimorphic crystal arranged in said housing; and, a vessel for a material gas for generating ozone; said vessel being arranged adjacently to an outside or an inside of said housing; said vessel for the material gas for generating ozone being irradiated with soft x-rays generated from said hemimorphic crystal through an x-ray transmission window; and wherein an ozonization chamber is arranged in said apparatus.

However, prior art fails to teach or fairly suggest the apparatus wherein said at least two hemimorphic crystals are arranged oppositely to each other at a space there between along an arched surface, and wherein said ozonization chamber is arranged at a center portion of said arched surface, in the manner required by Claim 44.

With respect to Claims 45 and 46, the prior art of record teaches many of the elements of the claimed invention, including an ozone generation method, comprising the steps of: arranging and repeatedly thermally exciting a number of hemimorphic crystals in a sealed low pressure gas housing for a cycle of a predetermined period of time, thereby generating x-rays and charged particles; inducing an intensive electric field so as to generate and project x-rays and charged particles from said hemimorphic

crystals to an x-ray target, thereby generating secondary x-rays; generating ozone by irradiating an oxygen gas material with the x-rays and/or the secondary x-rays.

However, prior art does not teach or fairly suggest the method wherein said crystals are arranged oppositely to each other, and wherein said thermal excitation is performed so that the cycles of said crystals are in a same phase or in opposite phases, in the manner required by each of Claims 45 and 46.

Claims 22-26, 28, 29, 31, and 34 are allowed by virtue of their dependency.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANASTASIA MIDKIFF whose telephone number is (571)272-5053. The examiner can normally be reached on M-F 7-4.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Glick can be reached on 571-272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/A. M./
Examiner, Art Unit 2882
2/27/09

/Edward J Glick/
Supervisory Patent Examiner, Art Unit 2882